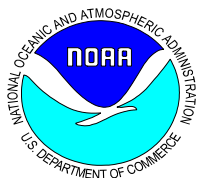




Committed to the
conservation
and recovery of the
endangered Hawaiian
monk seal



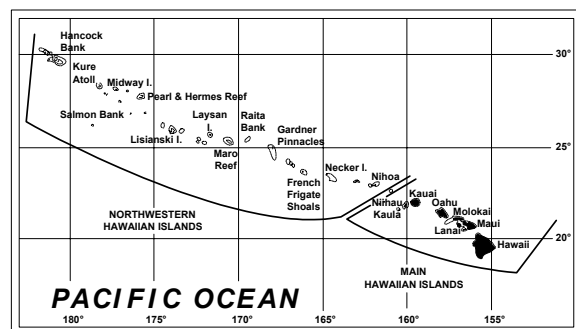
NOAA Fisheries
Pacific Islands Fisheries Science Center
2570 Dole Street
Honolulu, HI 96822-2396



*Sleeping lazily on the eggshell-colored sand, a female Hawaiian monk seal basks in the warm sunlight. Her light gray fur contrasts sharply with the small black head of a newborn pup peering out from behind her. Propping himself up on two small foreflippers, the pup opens his mouth to voice a loud, hoarse bark at an empty beach. The female lifts her head to peer beneath sleepy eyelids at her newborn, sniffs a short grunt of her own, and drops her head back to the sand. Reassured by his mother's nonchalance, the pup returns to suckle her underside again, unaware of the careful attention being paid them by the wildlife biologist crouched inconspicuously in the bushes. The young pup has reason to be wary, though not of the scientists there to study them. The Northwestern Hawaiian Islands are the only home for what used to be a thriving population of Hawaiian monk seals (*Monachus schauinslandi*). Today the population is at critically low levels, and the monk seals find themselves one of the Nation's most endangered species.*

A small number of Hawaiian monk seals reside in the main Hawaiian Islands (MHI) and, occasionally, monk seals are seen around all these islands. Seals are most frequently seen at the Northwestern end of the MHI, but most monk seals inhabit a chain of isolated islands called the Northwestern Hawaiian Islands (NWHI), which encompass their effective breeding area. The NWHI extend some 1,200 miles west of Kauai past Midway Atoll, their most famous island group, terminating at Kure Atoll. Some of the islands form steep basalt pinnacles while others are low-lying atolls whose coral-sand beaches rim ancient volcanic craters. The low-lying islands are

especially hospitable to mother seals who seek flat open beaches to bear and raise their young. Preferred pupping beaches offer easy access to protected shallow waters and are comparatively safe from sharks.



Historically, the NWHI have been used for a variety of human activities, which have contributed substantially to the seals' population decline. Beginning in the 19th century the islands were frequented by sealers, feather hunters, guano miners, and shipwrecked sailors, whose disturbance greatly impacted the seal population. The monk seals found a short reprieve in the early 1900s, but military activities during World War II at Midway and U.S. Coast Guard (USCG) occupation at Kure and French Frigate Shoals brought construction, machinery, and thousands of people to these remote atolls. This disturbance again caused a delayed but steady decline in the decades that followed.

The effect of human disturbance on monk seals is often not immediately apparent. Human disturbance results in abandonment of preferred and protected pupping locations by seals, and a subsequent decrease in pup survival. It may take several years before this decrease in pup survival manifests itself in an overall decrease in the seal population, but the effect is enduring.

Presently, monk seals are again able to find solitude in their remote habitat. In 1979 and 1992 the USCG abandoned their stations at French Frigate Shoals and Kure Atoll, respectively. In 1988, Midway was designated a wildlife refuge, and in 1997 its management was turned over to the U. S. Fish and Wildlife Service. With the entire NWHI now designated a wildlife refuge, monk seals can again enjoy solitude in their natural habitat. While the entire Hawaiian monk seal population is still critically endangered, on some islands the downhill spiral has begun to level out and in some cases has reversed. This modest rebound can be attributed, at least in part, to the cessation of human disturbance factors.

Under the watchful stewardship of NOAA's National Marine Fisheries Service (NMFS) Marine Mammal Research Program, the monk seal's population is meticulously monitored. Mandated to identify and, where possible, to eliminate causes of population decline and to enhance recovery of the monk seal species, the NMFS researchers are committed to ensuring the monk seal's survival.



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Hidden by a sand dune, photographers carefully document the behavioral interaction between mother and pup. The time, location, and a record of the pupping are coded for entry into a computerized database. With island subpopulations seldom exceeding 300 seals, the NMFS researchers attempt to track each individual in the population. The birth of single monk seal is significant; efforts will be made to monitor this pup for its entire life.

Female monk seals take at least four years to reach sexual maturity, and most will not bear young until they are six or seven years old. Pups are generally born during the spring and summer. Monk seals have only one pup in a year, and some mothers may bear young every year, though most pup sporadically. Seal pups will nurse for about six weeks, during which the mother will not leave her pup, not even to feed. This tenacity may work to the population's detriment, as it requires that the mother seal be healthy and well fed before pupping in order to produce enough milk for the young pup to nurse for a normal weaning period. Once the mother no longer produces milk,

she will abandon her pup, expecting it to forage for food on its own.

Monk seal pups do not imprint on their mothers the way some animals do. Occasionally mothers and pups are mixed up, and pups begin nursing from the wrong mother seal. If a newborn pup is mistakenly paired with a mother who has already been nursing for several weeks, the second mother will suckle the pup only until the end of her normal nursing period. Once the mother's milk stores are depleted, the pup is on its own, ready or not. This often leads to death for prematurely weaned pups that are not ready to forage for food on their own.



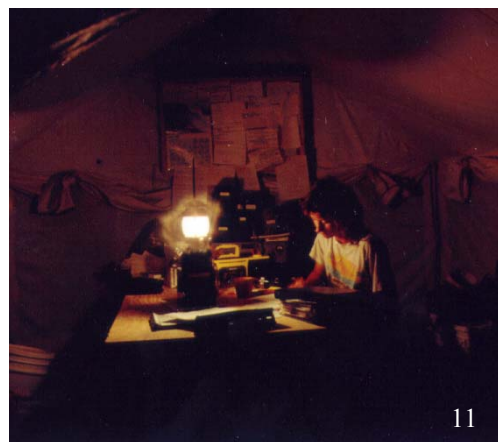
A healthy new-born pup weighs about 30 pounds but may grow to 200 pounds before weaning. The pup needs to gain all the weight that it can during this nursing period

because weaned pups endure dramatic weight loss as they learn to forage on their own, and many will not survive this transition to independence. Seals that reach adulthood will grow to weigh between 400 and 600 pounds and measure about 7 feet in length. The monk seal's diet consists mostly of benthic animals including an assortment of reef fishes, octopuses, eels, and crustaceans found by foraging on the slopes and banks around the NWHI. Adult monk seals have been known to spend days or even weeks away from the islands and to dive as deep as 1,500 feet to forage from submerged banks.



Returning to the field camp at the end of the day, the researchers review the day's events. A total of 73 seals were counted today, including the newborn pup and an adult seal that migrated from a neighbor island over 300 miles away. One dead seal was found washed ashore, entangled in fishing net. Two weaned pups were tagged and measured, and five scats (fecal samples) were collected for diet analysis. The new pup seen today seems healthy, and the NMFS staff will continue to monitor its development.

Although on average over 90% of the 200 pups born in the NWHI annually survive to weaning, substantially fewer survive their first year. Weaned pup survival rates vary significantly between islands and from one year to the next. In the 1980s first-year survival was 80% to 90%, but in recent years these rates have dropped, and in some places less than 30% may survive.



French Frigate Shoals, one of the atolls within the NWHI, has the largest resident population of monk seals. Unfortunately, it also has the highest mortality rate for weaned pups. Eighty-six percent of the weaned pups died before they reached one year of age in 1997, the poorest survival year on record. First-year survival has subsequently increased but is still low. Even though some breeding locations such as Kure Atoll and Pearl and Hermes Reef have higher juvenile survival rates and populations that are increasing, the species' population as a whole remains critically low. Evidence suggests that climatic changes may have reduced food availability at French Frigate Shoals, where starvation is one of the principal causes of monk seal mortality. Predation by sharks, mainly Galapagos and tiger sharks is another significant cause of mortality, particularly for nursing and weaned pups.

At some sites, the remaining population has a disproportionate number of males to females, which may have led to the increased incidence of seal "mobbings." Mobbing is a term that describes a group of aggressive adult male seals attempting to mate with a single seal, often inflicting



mortal wounds. Some adult males also attempt to mate with pups or immature seals of both sexes, again with fatal consequences.

Monk seals can become entangled in derelict fishing gear or debris. Typically, around 10 seals are observed entangled each year; NMFS researchers rescue some but others are found dead. This number is deceptively low, however, as the number of seals that become entangled but do not wash ashore is probably substantially higher.

In considering all of these threats, the fundamental cause for the monk seal's population decline is related to a variety of natural and human disturbance factors.



By continually assessing the status of the Hawaiian monk seal populations; identifying impediments to species recovery; employing, evaluating and improving innovative management, NOAA Fisheries actively facilitates monk seal survival. Some NOAA Fisheries projects include the following:

A highly successful rehabilitation program (1982 to 1994) nourished undersized weaned pups from French Frigate Shoals for release back into the wild at Kure Atoll.

A project to equalize seal sex ratios and reduce mobbings through translocation of adult male seals was successfully conducted at Laysan Island.

An ongoing project to identify and remove individual adult male seals known to kill pups.

Joint research ventures with other state, federal, and private organizations, have led to ground-breaking research in seal foraging behavior, food resource availability, reproductive biology, and epidemiological assessments.

Efforts are made to disentangle seals and remove trash, net debris, and other dangerous materials from haul-out sites. Similar cleanup efforts are conducted in the MHI and large-scale multiagency coral reef cleanup projects in the NWHI are in progress.





Photographs:

- Cover: Weaned monk seals basking in the sun at French Frigate Shoals. Photo by Mitch Craig.
- (1) Monk seal mother and pup at French Frigate Shoals. Photo by Mitch Craig.
 - (2) Abandoned turret at Midway Atoll. Photo by Carolyn Sramek.
 - (3) Vacant beach at Midway Atoll. Photo by Carolyn Sramek.
 - (4) Weaned seal. Photo by Mitch Craig.
 - (5) Weaned seals swimming at French Frigate Shoals. Photo by Mitch Craig.
 - (6) Weaned and adult monk seals at Pearl and Hermes Reef. Photo by Chad Yoshinaga.
 - (7) Subadult seal with algae growing around her whiskers. Photo by Brad Ryon.
 - (8) Photographers at French Frigate Shoals. Photo by Mitch Craig.
 - (9) Juvenile monk seal foraging for food. Photo by Raymond Boland.
 - (10) Field camp at Lisianski Island. Photo by Carolyn Sramek.
 - (11) Nighttime data entry at Laysan Island. Photo by Brenda Becker.
 - (12) Juvenile monk seal found entangled in fishing net at French Frigate Shoals. The seal in this photograph was freed from the entanglement, although another seal not pictured was found drowned in the same fishing net. Photo by Raymond Boland.
 - (13) Weaned monk seals frolicking in the surf at French Frigate Shoals. Photo by Mitch Craig.
 - (14) Scuba divers drag derelict fishing nets to an awaiting small boat as part of a net debris cleanup effort at French Frigate Shoals. Photo by Carolyn Sramek.
 - (15) Adult males "jousting" over access to a female seal. Photo by Brenda Becker.
 - (16) Tons of derelict fishing gear were hauled from the reef as part of a net debris cleanup effort at French Frigate Shoals. Photo by Carolyn Sramek.
 - (17) A weaned pup bares his sharp teeth. Photo by Chad Yoshinaga.
 - (18) Field camp at Pearl and Hermes Reef. Photo by Chad Yoshinaga.
 - (19) A newborn pup sleeping on the beach at Laysan Island. Photo by Brenda Becker.
 - (20) Weaned monk seal resting on the beach at Lisianski Island. Photo by Alan Kam.